I Claim:

1. A tube device responsive to photons of electromagnetic energy to produce an electrical response, said tube device comprising:

a device body holding a window member for passing photons of electromagnetic energy in a selected direction, a photocathode receiving said photons of electromagnetic energy and responsively releasing photoelectrons generally along said direction, a microchannel plate receiving said photoelectrons and responsively providing a shower of secondary-emission electrons generally moving in said selected direction;

said device body and said window member cooperating defining yieldably deformable sealing means for allowing relative movement of said photocathode relative to said tube body along said selected direction; and

said device body further carrying an electrical contact pad in electrical contact with said microchannel plate.

2. The tube device of Claim 1 further including yieldably deformable contact means for allowing said microchannel plate to move simultaneous along said selected direction in unison with said photocathode.

3. The tube device of Claim 1 further including fine-dimension spacing structure extending between said photocathode and said microchannel plate and moving said microchannel plate in unison with said photocathode when said window member is moved in said selected direction by yielding deformation of said sealing means.

4. The tube device of Claim 3 wherein said photocathode includes an active area, said fine-dimension spacing structure circumscribes said active area.

5. The tube device of Claim 3 wherein said fine-dimension spacing structure is integral with said photocathode.

6. An image intensifier tube having a body, said body holding: a photocathode, a microchannel plate, and a display electrode; the image intensifier tube receiving photons of light and responsively providing a visible image, said image intensifier tube comprising:

said body including a ring-like portion defining an annular step upon which is disposed an electrical contact structure;

said microchannel plate being disposed upon said step, and contacting said electrical contact structure, said contact structure making electrical contact both with a surface electrode disposed on one face of the microchannel plate and with a surface electrode disposed on the opposite face of the microchannel plate;

a fine-dimension axially extending insulative spacing structure extending between the photocathode and the microchannel plate and physically touching at least one of the microchannel plate and photocathode to capture the microchannel plate in a selected axial position on said step and in electrical contact with said electrical contact structure, thus to establish a selected fine-dimension spacing between the microchannel plate and an active portion of the photocathode; and

said body further including a yieldably deformable and axially-variable sealing structure sealingly uniting the body portion with a window member, said window member carrying said photocathode;

whereby the yieldable and axially-variable sealing structure yields to accommodate dimensional variabilities for both the body portion and the window member, and the fine-dimension spacing of the photocathode from the microchannel plate is maintained by said fine-dimension spacing structure and is substantially independent of these dimensional variabilities.

7. A night vision device including an objective lens, an image intensifier tube according to Claim 6, an eyepiece lens, and a power supply for operating said image intensifier tube.

8. An image intensifier tube responsive to photons of light to provide a visible image, said image intensifier tube comprising:

a tube body having a front window member for receiving light, a body portion holding said front window, and a rear window from which said visible image is provided outwardly of said image intensifier tube;

a photocathode carried on an inner face of said front window member and receiving said light to responsively release photoelectrons generally axially of said tube body;

a microchannel plate receiving said photoelectrons and responsively providing a shower of secondary-emission electrons generally moving along said axial direction;

a phosphorescent screen carried on an inner surface of said rear window and responding to said shower of secondary-emission electrons to provide a visible image which is conducted outwardly of said tube via said rear window member;

said tube body including a generally annular body member including an inner annular step upon which is disposed said microchannel plate;

yieldably deformable variable-dimension electrical contact pad structure disposed upon said step and allowing said microchannel plate to move axially relative to said tube body while maintaining electrical contact with said microchannel plate.

9. The image intensifier tube of Claim 8 wherein said tube body member and said front window member are sealingly attached to one another by yieldably deformable sealing means, said yieldably deformable sealing means allowing relative movement of said front window member relative to said tube body along said axial direction.

10. The image intensifier tube of Claim 9 wherein said yieldably deformable variable-dimension electrical contact pad structure includes an axially extending body of yieldable metal.

11. The image intensifier tube of Claim 8 further including fine-dimension spacing structure extending between said photocathode and said microchannel plate, said spacing structure moving said microchannel plate in unison with said photocathode when said window member is moved in an axial direction by yielding deformation of said sealing means, and said body of yieldable metal of said yieldably deformable variable-dimension electrical contact structure yielding

to allow axial movement of said microchannel plate in unison with said window member while maintaining electrical contact with said microchannel plate.

12. The image intensifier tube of Claim 11 wherein said photocathode includes an active area, said fine-dimension spacing structure circumscribing said active area.

13. The image intensifier tube of Claim 12 wherein said fine-dimension spacing structure is integral with said photocathode.

14. An image intensifier tube, said image intensifier tube comprising:

a photocathode, a microchannel plate, and a display electrode; the image intensifier tube receiving photons of light and responsively providing a visible image, said image intensifier tube comprising:

an electrical contact structure maintaining electrical contact with said microchannel plate;

a fine-dimension axially extending insulative spacing structure extending between the photocathode and the microchannel plate to establish a selected fine-dimension spacing between the microchannel plate and an active portion of the photocathode; and

a yieldably deformable and axially-variable sealing structure sealingly uniting the body portion with a window member, said window member carrying said photocathode;

whereby the yieldable and axially-variable sealing structure yields in response to axial relative movement between said body portion and said window member while said fine-dimension spacing structure maintains a fine-dimension gap between the photocathode and microchannel plate.

15. A night vision device including an image intensifier tube according to Claim 14.

16. A method of making an image intensifier tube, said method including the steps of:

providing an annular tube body;

providing a microchannel plate disposed within said tube body;

providing an electrical contact structure between said tube body and said microchannel plate;

providing a yieldably deformable and axially-variable sealing structure sealingly uniting the tube body with a window member, said window member carrying a photocathode; and

yielding said axially-variable sealing structure while maintaining a selected fine-dimension spacing between the photocathode and microchannel plate.

17. The method of Claim 16 further including the step of forming fine-dimension spacing structure extending axially between said photocathode and said microchannel plate.

18. The method of Claim 17 wherein said fine-dimension spacing structure is formed integrally with said photocathode.

19. The method of Claim 16 further including the step of providing yieldably deformable electrical contact structure between said tube body and said microchannel plate.

20. An image intensifier tube having a body, said body including: a front window, a ring-like body member, a photocathode, a microchannel plate, and a rear window with a display electrode; the image intensifier tube receiving photons of light via said front window and responsively providing a visible image via said rear window, said image intensifier tube comprising:

said ring-like body member defining an annular step upon which is disposed an electrical contact structure;

said microchannel plate being disposed upon said step, and contacting said electrical contact structure, said contact structure making electrical contact both with a surface electrode disposed on one face of the microchannel plate and with a surface electrode disposed on the opposite face of the microchannel plate;

said front window carrying said photocathode, and said body including a yieldable seal structure attaching said front window to said ring-like body member;

a fine-dimension axially extending insulative spacing structure extending between the photocathode and the microchannel plate and physically touching at least one of the microchannel plate and photocathode to capture the microchannel plate in a selected axial position on said step and in electrical contact with said electrical contact structure, thus to establish a selected fine-dimension spacing between the microchannel plate and an active portion of the photocathode; and

said front window and said ring-like body member each having a respective diameter, with the respective diameters of said front window and body member being substantially the same, said rear window being of a smaller diameter than said front window and sealingly attaching to said body member at an end thereof opposite to said front window thus to expose an axially disposed annular surface portion of said body member;

said ring-like body member defining electrical contact structure disposed upon said axially disposed annular portion thereof and including at least four contact pads, with respective ones of said at least four contact pads electrically connecting internally of said body member individually with: said photocathode, a front face of said microchannel plate, a rear face of said microchannel plate, and said display electrode; and

an annular high-voltage power supply circuit module securing to said body at said axially disposed annular surface portion thereof, said power supply circuit module making electrical contact with each of said at least four contact pads.

21. A tube device for amplifying light from a scene and providing an image signal, said tube device comprising: a body holding a front window for receiving light, a photocathode upon which the received light is directed to produce photoelectrons, a microchannel plate receiving the photoelectrons and responsively providing a shower of secondary emission electrons, and a transducer device receiving the shower of secondary emission electrons and responsively providing an image signal; said body including a ring-like portion carrying electrical contact structure; said microchannel plate being disposed within said body and making electrical contact with said electrical contact structure; fine-dimension axially extending insulative spacing structure extending between and touching the photocathode and the microchannel plate to capture the microchannel plate in a selected axial position in said housing to establish a selected fine-dimension spacing between the microchannel plate and an active portion of the photocathode.

22. The tube device of Claim 21 wherein said body further includes a yieldably deformable and axially-variable sealing structure sealingly uniting the body portion with said window member, said window member carrying said photocathode.

23. An image tube responsive to photons of light to provide an output response, said image tube comprising: a tube body having a front window member for receiving light, a body portion holding said front window, and a photocathode carried on an inner face of said front window member and receiving said light to responsively release photoelectrons generally axially of said tube body; a microchannel plate receiving said photoelectrons and responsively providing a shower of secondary-emission electrons generally moving along said axial direction; and transducer means for receiving the shower of secondary emission electrons and responsively providing an output responses; said tube body including a generally annular body member including means for holding and making electrical contact with said microchannel plate; and axially yieldable sealing means disposed to unit and seal said front window member and said body portion while allowing axial relative movement therebetween during assembly of said tube device in response to application of sufficient axial force.

24. The image tube of Claim 23 further including fine-dimension spacing structure extending between said photocathode and said microchannel plate, said spacing structure contacting between said microchannel plate and said photocathode when said window member is moved in an axial direction by yielding deformation of said sealing means.

25. The image tube of Claim 23 wherein said photocathode includes an active area, said fine-dimension spacing structure circumscribing said active area.

26. The image tube of Claim 24 wherein said fine-dimension spacing structure is integral with said photocathode.

27. A method of making an image tube, said method including the steps of:

providing a tube body;

providing a window member for the front of the image tube;

providing a microchannel plate with opposite facial electrodes, and disposing this microchannel plate within the tube body;

providing an electrical contact structure extending to and making respective electrical contact with the opposite facial electrodes of the microchannel plate.

providing a yieldably deformable and axially-variable sealing structure sealingly uniting the tube body with a window member, said window member carrying a photocathode; and

yielding said axially-variable sealing structure in order to achieve a selected fine-dimension spacing between the photocathode and microchannel plate.

28. The method of Claim 27 further including the step of forming fine-dimension spacing structure extending axially between said photocathode and said microchannel plate.

29. The method of Claim 17 further including the step of forming the fine-dimension spacing structure integrally with the photocathode.